

SEQUENCE LISTING

<110> Olaf Schneewind
Sarkis Mazmanian
Gwen Liu
Hung Ton-That

<120> IDENTIFICATION OF SORTASE GENE

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<160> 36

<170> FastSEQ for Windows Version 3.0

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<213> Bacteria

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<212> DNA

<213> Staphylococcus aureus

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Ile	Leu	Val	Ala	Ala	Tyr	Leu	Phe	Ala	Lys	Pro	His	Ile	Asp	Asn	Tyr	
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Leu	His	Asp	Lys	Asp	Lys	Asp	Glu	Lys	Ile	Glu	Gln	Tyr	Asp	Lys	Asn	
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Ala	Asp	Ile	Lys	Glu	Pro	Val	Tyr	Pro	Gly	Pro	Ala	Thr	Pro	Glu	Gln	
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Leu	Asn	Arg	Gly	Val	Ser	Phe	Ala	Glu	Glu	Asn	Glu	Ser	Leu	Asp	Asp	
			100					105					110			
caa	aat	att	tca	att	gca	gga	cac	act	ttc	att	gac	cgt	ccg	aac	tat	384
Gln	Asn	Ile	Ser	Ile	Ala	Gly	His	Thr	Phe	Ile	Asp	Arg	Pro	Asn	Tyr	
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caa	ttt	aca	aat	ctt	aaa	gca	gcc	aaa	aaa	ggg	agt	atg	gtg	tac	ttt	432
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Val	Lys	Pro	Thr	Asp	Val	Gly	Val	Leu	Asp	Glu	Gln	Lys	Gly	Lys	Asp	
				165					170					175		
aaa	caa	tta	aca	tta	att	act	tgt	gat	gat	tac	aat	gaa	aag	aca	ggc	576
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Leu	His	Asp	Lys	Asp	Lys	Asp	Glu	Lys	Ile	Glu	Gln	Tyr	Asp	Lys	Asn	
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Val	Lys	Glu	Gln	Ala	Ser	Lys	Asp	Lys	Lys	Gln	Gln	Ala	Lys	Pro	Gln	
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Ala	Asp	Ile	Lys	Glu	Pro	Val	Tyr	Pro	Gly	Pro	Ala	Thr	Pro	Glu	Gln	

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Gln	Asn	Ile	Ser	Ile	Ala	Gly	His	Thr	Phe	Ile	Asp	Arg	Pro	Asn	Tyr
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Gln	Phe	Thr	Asn	Leu	Lys	Ala	Ala	Lys	Lys	Gly	Ser	Met	Val	Tyr	Phe
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Val	Lys	Pro	Thr	Asp	Val	Gly	Val	Leu	Asp	Glu	Gln	Lys	Gly	Lys	Asp
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Lys	Gln	Leu	Thr	Leu	Ile	Thr	Cys	Asp	Asp	Tyr	Asn	Glu	Lys	Thr	Gly
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 <213> Streptococcus pyogenes

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			20					25					30		
Lys	Asn	Tyr	Glu	Ser	Leu	Leu	Gln	Ile	Glu	Asn	Asn	Asp	Ile	Met	Gly
		35					40					45			
Tyr	Val	Glu	Val	Pro	Ser	Ile	Lys	Val	Thr	Leu	Pro	Ile	Tyr	His	Tyr
		50				55					60				
Thr	Thr	Asp	Glu	Val	Leu	Thr	Lys	Gly	Ala	Gly	His	Leu	Phe	Gly	Ser
65					70					75					80
Ala	Leu	Pro	Val	Gly	Gly	Asp	Gly	Thr	His	Thr	Val	Ile	Ser	Ala	His
				85					90					95	
Arg	Gly	Leu	Pro	Ser	Ala	Glu	Met	Phe	Thr	Asn	Leu	Asn	Leu	Val	Lys
			100					105					110		
Lys	Gly	Asp	Thr	Phe	Tyr	Phe	Arg	Val	Leu	Asn	Lys	Val	Leu	Ala	Tyr
		115					120					125			
Lys	Val	Asp	Gln	Ile	Leu	Thr	Val	Glu	Pro	Asp	Gln	Val	Thr	Ser	Leu
		130				135					140				
Ser	Gly	Val	Met	Gly	Lys	Asp	Tyr	Ala	Thr	Leu	Val	Thr	Cys	Thr	Pro
145					150					155					160
Tyr	Gly	Val	Asn	Thr	Lys	Arg	Leu	Leu	Val	Arg	Gly	His	Arg	Ile	Ala
			165						170					175	
Tyr	His	Tyr	Lys	Lys	Tyr	Gln	Gln	Ala	Lys	Lys	Ala	Met	Lys	Leu	Val
			180					185					190		
Asp	Lys	Ser	Arg	Met	Trp	Ala	Glu	Val	Val	Cys	Ala	Ala	Phe	Gly	Val
		195					200					205			
Val	Ile	Ala	Ile	Ile	Leu	Val	Phe	Met	Tyr	Ser	Arg	Val	Ser	Ala	Lys
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 <213> Actinomyces naeslundii

<400> 5

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			20					25					30		
Arg	Pro	Asp	Ala	Lys	Thr	Gln	Val	Glu	Gln	Ala	His	Ala	Tyr	Asn	Asp
		35					40					45			
Ala	Leu	Ser	Ala	Gly	Ala	Val	Leu	Glu	Ala	Asn	Asn	His	Val	Pro	Thr
	50					55				60					
Gly	Ala	Gly	Ser	Ser	Lys	Asp	Ser	Ser	Leu	Gln	Tyr	Ala	Asn	Ile	Leu
65					70					75					80
Lys	Ala	Asn	Asn	Glu	Gly	Leu	Met	Ala	Arg	Leu	Lys	Ile	Pro	Ser	Ile
				85					90					95	
Ser	Leu	Asp	Leu	Pro	Val	Tyr	His	Gly	Thr	Ala	Asp	Asp	Thr	Leu	Leu
			100					105					110		
Lys	Gly	Leu	Gly	His	Leu	Glu	Gly	Thr	Ser	Leu	Pro	Val	Gly	Gly	Glu
		115					120					125			
Gly	Thr	Arg	Ser	Val	Ile	Thr	Gly	His	Arg	Gly	Leu	Ala	Glu	Ala	Thr
	130					135					140				
Met	Phe	Thr	Asn	Leu	Asp	Lys	Val	Lys	Thr	Gly	Asp	Ser	Leu	Ile	Val
145					150					155					160
Glu	Val	Phe	Gly	Glu	Val	Leu	Thr	Tyr	Arg	Val	Thr	Ser	Thr	Lys	Val
			165						170					175	
Val	Glu	Pro	Glu	Glu	Thr	Glu	Ala	Leu	Arg	Val	Glu	Glu	Gly	Lys	Asp
			180					185					190		
Leu	Leu	Thr	Leu	Val	Thr	Cys	Thr	Pro	Leu	Gly	Ile	Asn	Thr	His	Arg
		195					200					205			
Ile	Leu	Leu	Thr	Gly	Glu	Arg	Ile	Tyr	Pro	Thr	Pro	Ala	Lys	Asp	Leu
	210					215					220				
Ala	Ala	Ala	Gly	Lys	Arg	Pro	Asp	Val	Pro	His	Phe	Pro	Trp	Trp	Ala
225					230					235					240
Val	Gly	Leu	Ala	Ala	Gly	Leu	Ile	Val	Val	Gly	Leu	Tyr	Leu	Trp	Arg
			245						250					255	
Ser	Gly	Tyr	Ala	Ala	Ala	Arg	Ala	Lys	Glu	Arg	Ala	Leu	Ala	Arg	Ala
			260					265					270		
Arg	Ala	Ala	Gln	Glu	Glu	Pro	Gln	Pro	Gln	Thr	Trp	Ala	Glu	Gln	Met
		275					280					285			
Arg	Ile	Trp	Met	Asp	Asp	Asp	Ala	Gly	Val	Glu	Pro	Gln	Arg	Trp	Phe
	290				295						300				
Thr	Asp	Leu	Pro	Val	Pro	Pro	Gln	Pro	Ser	Glu	Met	Glu	Asn	Leu	Ala
305					310					315					320
Leu	Leu	Glu	Glu	Ile	Ala	Ser	Leu	Ser	Ala	Pro	Ser	Gly	Arg	Trp	Asp
				325					330					335	
Asp	Gln	Glu	Leu	Ile	Asp	Thr	Ala	Glu	Ile	Pro	Val	Leu	Asp	Ala	Thr
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Arg	Pro	Ser	Ala	Gly	Thr	Ser	Gly	Arg	Thr	His	Arg	Leu			
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			20					25					30			
Ala	Leu	Asn	Asn	Tyr	Leu	Asp	Gln	Gln	Ile	Ile	Ala	His	Tyr	Gln	Ala	
		35					40					45				
Lys	Ala	Ser	Gln	Glu	Asn	Thr	Lys	Glu	Met	Ala	Glu	Leu	Gln	Glu	Lys	
	50					55					60					
Met	Glu	Lys	Lys	Asn	Gln	Glu	Leu	Ala	Lys	Lys	Gly	Ser	Asn	Pro	Gly	
65				70						75					80	
Leu	Asp	Pro	Phe	Ser	Glu	Thr	Gln	Lys	Thr	Thr	Lys	Lys	Pro	Asp	Lys	
				85					90					95		
Ser	Tyr	Phe	Glu	Ser	His	Thr	Ile	Gly	Val	Leu	Thr	Ile	Pro	Lys	Ile	
			100					105					110			
Asn	Val	Arg	Leu	Pro	Ile	Phe	Asp	Lys	Thr	Asn	Ala	Leu	Leu	Leu	Glu	
		115					120					125				
Lys	Gly	Ser	Ser	Leu	Leu	Glu	Gly	Thr	Ser	Tyr	Pro	Thr	Gly	Gly	Thr	
	130					135					140					
Asn	Thr	His	Ala	Val	Ile	Ser	Gly	His	Arg	Gly	Leu	Pro	Gln	Ala	Lys	
145					150					155					160	
Leu	Phe	Thr	Asp	Leu	Pro	Glu	Leu	Lys	Lys	Gly	Asp	Glu	Phe	Tyr	Ile	
				165					170					175		
Glu	Val	Asn	Gly	Lys	Thr	Leu	Ala	Tyr	Gln	Val	Asp	Gln	Ile	Lys	Thr	
			180					185					190			
Val	Glu	Pro	Thr	Asp	Thr	Lys	Asp	Leu	His	Ile	Glu	Ser	Gly	Gln	Asp	
	195						200					205				
Leu	Val	Thr	Leu	Leu	Thr	Cys	Thr	Pro	Tyr	Met	Ile	Asn	Ser	His	Arg	
	210					215					220					
Leu	Leu	Val	Arg	Gly	His	Arg	Ile	Pro	Tyr	Gln	Pro	Glu	Lys	Ala	Ala	
225					230					235					240	
Ala	Gly	Met	Lys	Lys	Val	Ala	Gln	Gln	Gln	Asn	Leu	Leu	Leu	Trp	Thr	
				245					250					255		
Leu	Leu	Leu	Ile	Ala	Cys	Ala	Leu	Ile	Ile	Ser	Gly	Phe	Ile	Ile	Trp	
			260					265					270			
Tyr	Lys	Arg	Arg	Lys	Lys	Thr	Thr	Arg	Lys	Pro	Lys					
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 <213> Streptococcus mutans

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			20					25					30			

Thr	Pro	Ile	Arg	Asn	Ala	Leu	Ile	Ala	Trp	Asn	Thr	Asn	Arg	Tyr	Gln
		35					40					45			
Val	Ser	Asn	Val	Ser	Lys	Lys	Asp	Ile	Glu	His	Asn	Lys	Ala	Ala	His
	50					55					60				
Ser	Ser	Phe	Asp	Phe	Lys	Lys	Val	Glu	Ser	Ile	Ser	Thr	Gln	Ser	Val
65					70					75				80	
Leu	Ala	Ala	Gln	Met	Ala	Ala	Gln	Lys	Leu	Pro	Val	Ile	Gly	Gly	Ile
				85					90					95	
Ala	Ile	Pro	Asp	Leu	Lys	Ile	Asn	Leu	Pro	Ile	Phe	Lys	Gly	Leu	Asp
			100					105					110		
Asn	Val	Gly	Leu	Thr	Tyr	Gly	Ala	Gly	Thr	Met	Lys	Asn	Asp	Gln	Val
		115					120					125			
Met	Gly	Glu	Asn	Asn	Tyr	Ala	Leu	Ala	Ser	His	His	Val	Phe	Gly	Met
	130					135					140				
Thr	Gly	Ser	Ser	Gln	Met	Leu	Phe	Ser	Pro	Leu	Glu	Arg	Ala	Lys	Glu
145					150					155					160
Gly	Met	Glu	Ile	Tyr	Leu	Thr	Asp	Lys	Asn	Lys	Val	Tyr	Thr	Tyr	Val
				165					170					175	
Ile	Ser	Glu	Val	Lys	Thr	Val	Thr	Pro	Glu	His	Val	Glu	Val	Ile	Asp
			180					185					190		
Asn	Arg	Pro	Gly	Gln	Asn	Glu	Val	Thr	Leu	Val	Thr	Cys	Thr	Asp	Ala
		195					200					205			
Gly	Ala	Thr	Ala	Arg	Thr	Ile	Val	His	Gly	Thr	Tyr	Lys	Gly	Glu	Asn
	210					215					220				
Asp	Phe	Asn	Lys	Thr	Ser	Lys	Lys	Ile	Lys	Lys	Ala	Phe	Arg	Gln	Ser
225					230					235					240
Tyr	Asn	Gln	Ile	Ser	Phe										
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			20					25					30		
Gln	Thr	Leu	Lys	Glu	Ala	Lys	Leu	Ala	Ala	Lys	Lys	Pro	Gln	Glu	Ala
		35					40					45			
Ser	Gly	Thr	Lys	Asn	Ser	Thr	Asp	Gln	Ala	Lys	Asn	Lys	Ala	Ser	Phe
	50					55					60				
Lys	Pro	Glu	Thr	Gly	Gln	Ala	Ser	Gly	Ile	Leu	Glu	Ile	Pro	Lys	Ile
65					70					75				80	
Asn	Ala	Glu	Leu	Pro	Ile	Val	Glu	Gly	Thr	Asp	Ala	Asp	Asp	Leu	Glu
				85					90					95	
Lys	Gly	Val	Gly	His	Tyr	Lys	Asp	Ser	Tyr	Tyr	Pro	Asp	Glu	Asn	Gly
			100					105					110		
Gln	Ile	Val	Leu	Ser	Gly	His	Arg	Asp	Thr	Val	Phe	Arg	Arg	Thr	Gly
		115					120					125			
Glu	Leu	Glu	Lys	Gly	Asp	Gln	Leu	Arg	Leu	Leu	Leu	Ser	Tyr	Gly	Glu
	130						135				140				

Phe	Thr	Tyr	Glu	Ile	Val	Lys	Thr	Lys	Ile	Val	Asp	Lys	Asp	Asp	Thr
145					150					155					160
Ser	Ile	Ile	Thr	Leu	Gln	His	Glu	Lys	Glu	Glu	Leu	Ile	Leu	Thr	Thr
				165					170						175
Cys	Tyr	Pro	Phe	Ser	Tyr	Val	Gly	Asn	Ala	Pro	Lys	Arg	Tyr	Ile	Ile
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Tyr	Gly	Lys	Arg	Val	Thr										
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 <213> Staphylococcus aureus

Glu	Glu	Asn	Pro	Phe	Ile	Gly	Thr	Thr	Val	Phe	Gly	Gly	Leu	Ser	Leu
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Ala	Leu	Gly	Ala	Ala	Leu	Leu	Ala	Gly							
			20					25							

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 <213> Staphylococcus aureus

Gly	Glu	Glu	Ser	Thr	Asn	Lys	Gly	Met	Leu	Phe	Gly	Gly	Leu	Phe	Ser
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			20												

<210> 11
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 <213> Staphylococcus sobrinus

Asp	Ser	Ser	Asn	Ala	Tyr	Leu	Pro	Leu	Leu	Gly	Leu	Val	Ser	Leu	Thr
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Ala	Gly	Phe	Ser	Leu	Leu	Gly	Leu								
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<210> 12
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 <213> Enterococcus faecalis

Glu	Lys	Gln	Asn	Val	Leu	Leu	Thr	Val	Val	Gly	Ser	Leu	Ala	Ala	Met
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Leu	Gly	Leu	Ala	Gly	Leu	Gly	Phe								
			20												

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<212> PRT
<213> Streptococcus pyogenes

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Ser Ile Gly Thr Tyr Leu Phe Lys Ile Gly Ser Ala Ala Met Ile Gly
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Ala Ile Gly Ile Tyr Ile Val
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<210> 14
<211> 22
<212> PRT
<213> Listeria monocytogenes

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Thr Ala Met Ala Leu Thr
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Arg Ser Arg Glu Leu
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Ser Arg Arg Glu Leu
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Arg Ser Arg Ser Ser
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Ser Arg Arg Ser Ser
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<210> 31

<211> 19

<212> PRT

<213> Mutated derived from streptococcus pyogenes

<400> 31

His His His His His His Ala Gln Ala Leu Glu Pro Thr Gly Glu Glu
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Asn Pro Phe

<210> 32

<211> 29

<212> DNA

<213> Staphylococcus aureus

<400> 32

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29

<210> 33

<211> 29

<212> DNA

<213> Staphylococcus aureus

<400> 33

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<210> 34

<211> 283

<212> PRT

<213> Streptococcus pneumoniae srtA

<400> 34

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20 25 30
Ser Leu Gly Gln Val Lys Gly His Ala Thr Phe Val Lys Ser Met Thr
35 40 45
Thr Glu Met Tyr Gln Glu Gln Gln Asn His Ser Leu Ala Tyr Asn Gln
50 55 60
Arg Leu Ala Ser Gln Asn Arg Ile Val Asp Pro Phe Leu Ala Glu Gly
65 70 75 80
Tyr Glu Val Asn Tyr Gln Val Ser Asp Asp Pro Asp Ala Val Tyr Gly
85 90 95
Tyr Leu Ser Ile Pro Ser Leu Glu Ile Met Glu Pro Val Tyr Leu Gly

Ala	Asp	Tyr	100	His	His	Leu	Gly	Met	105	Gly	Leu	Ala	His	Val	110	Asp	Gly	Thr
		115						120						125				
Pro	Leu	Pro	Leu	Asp	Gly	Thr	Gly	Ile	Arg	Ser	Val	Ile	Ala	Gly	His			
	130				135					140								
Arg	Ala	Glu	Pro	Ser	His	Val	Phe	Phe	Arg	His	Leu	Asp	Gln	Leu	Lys			
145					150					155					160			
Val	Gly	Asp	Ala	Leu	Tyr	Tyr	Asp	Asn	Gly	Gln	Glu	Ile	Val	Glu	Tyr			
			165						170					175				
Gln	Met	Met	Asp	Thr	Glu	Ile	Ile	Leu	Pro	Ser	Glu	Trp	Glu	Lys	Leu			
			180					185					190					
Glu	Ser	Val	Ser	Ser	Lys	Asn	Ile	Met	Thr	Leu	Ile	Thr	Cys	Asp	Pro			
	195					200						205						
Ile	Pro	Thr	Phe	Asn	Lys	Arg	Leu	Leu	Val	Asn	Phe	Glu	Arg	Val	Ala			
	210				215						220							
Val	Tyr	Gln	Lys	Ser	Asp	Pro	Gln	Thr	Ala	Ala	Val	Ala	Arg	Val	Ala			
225					230					235								
Phe	Thr	Lys	Glu	Gly	Gln	Ser	Val	Ser	Arg	Val	Ala	Thr	Ser	Gln	Trp			
			245						250					255				
Leu	Tyr	Arg	Gly	Leu	Val	Val	Leu	Ala	Phe	Leu	Gly	Ile	Leu	Phe	Val			
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Leu	Trp	Lys	Leu	Ala	Arg	Leu	Leu	Arg	Gly	Lys								
		275					280											

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 <211> 296
 <212> PRT
 <213> Streptococcus pneumoniae srtB

<400> 35

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His	Pro	Leu	Ile	Leu	Leu	Leu	Ile	Phe	Leu	Val	Gly	Phe	Ala	Val	Ala			
			20					25					30					
Ile	Tyr	Pro	Leu	Val	Ser	Arg	Tyr	Tyr	Tyr	Arg	Ile	Ser	Asn	Glu	Val			
	35						40					45						
Ile	Lys	Glu	Phe	Asp	Glu	Thr	Val	Ser	Gln	Met	Asp	Lys	Ala	Glu	Leu			
	50					55					60							
Glu	Glu	Arg	Trp	Arg	Leu	Ala	Gln	Ala	Phe	Asn	Ala	Thr	Leu	Lys	Pro			
65					70					75					80			
Ser	Glu	Ile	Leu	Asp	Pro	Phe	Thr	Glu	Gln	Glu	Lys	Lys	Lys	Gly	Val			
			85						90					95				
Ser	Glu	Tyr	Ala	Asn	Met	Leu	Lys	Val	His	Glu	Arg	Ile	Gly	Tyr	Val			
			100					105					110					
Glu	Ile	Pro	Ala	Ile	Asp	Gln	Glu	Ile	Pro	Met	Tyr	Val	Gly	Thr	Ser			
	115						120					125						
Glu	Asp	Ile	Leu	Gln	Lys	Gly	Ala	Gly	Leu	Leu	Glu	Gly	Ala	Ser	Leu			
	130					135					140							
Pro	Val	Gly	Gly	Glu	Asn	Thr	His	Thr	Val	Ile	Thr	Ala	His	Arg	Gly			
145					150					155					160			
Leu	Pro	Thr	Ala	Glu	Leu	Phe	Ser	Gln	Leu	Asp	Lys	Met	Lys	Lys	Gly			
			165						170					175				
Asp	Ile	Phe	Tyr	Leu	His	Val	Leu	Asp	Gln	Val	Leu	Ala	Tyr	Gln	Val			

				245					250					255		
Tyr	Leu	Phe	Tyr	Val	Ala	Val	Gly	Leu	Ile	Val	Ile	Leu	Leu	Trp	Ile	
			260					265					270			
Ile	Arg	Arg	Leu	Arg	Lys	Lys	Lys	Lys	Gln	Pro	Glu	Lys	Ala	Leu	Lys	
		275					280					285				
Ala	Leu	Lys	Ala	Ala	Arg	Lys	Glu	Val	Lys	Val	Glu	Asp	Gly	Gln	Gln	
	290					295					300					

245
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